

**A POPULATION STUDY OF CACOECIA CERASIVORANA FITCH WITH SPECIAL REFERENCE TO ITS INSECT PARASITES (TORTRICIDAE-LEPIDOPTERA).\***

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During the early summer of 1932, a number of nests containing *C. cerasivorana* larvae were collected on choke-cherry near St. Paul, Minnesota. These nests were placed in breeding cages in a basement room, which was maintained at a temperature of about 23° C., and soon thereafter adults of this species as well as many of its parasites began emerging. The fact that the empty pupal skins are left projecting from the nest, following moth issuance, suggested that if collections were made at the right time, one could make an accurate count of the total population of moths emerging from the nests, the number of living larvae, the parasites, etc. In this way, it would be possible to make a quantitative population study of this species in a given micro-habitat, the insects having been subjected to the natural conditions of their environment.

*Literature and Notes on C. cerasivorana.*—As determined by Weed (1900), the eggs are laid in summer in flattened masses on the bark of choke-cherry near the ground, and after assuming a dark brown color they are difficult to distinguish from the bark. The eggs hatch in the spring and the larvae construct their nest which is usually cone-shaped. The nests observed by the writer along a roadside near St. Paul, Minnesota, varied greatly in size and usually enveloped an entire branch or a group of branches of the choke-cherry. In several instances webs, inside of which the larvae fed, encircled an entire shrub. Although the choke-cherry is the principal food plant, this species also feeds upon wild cherry, apple, raspberry (Patch, 1907), garden cherry, and birch (Britton, 1912). Patch (1907) collected a newly hatched colony on choke-cherry at Portland, Maine, on June 20 and another on wild cherry at Orono on June 12. The larvae of both were reared in the insectary on apple leaves and the moths developing from the first colony had mostly emerged by August 6, while those of the second colony emerged August 5 to August 12.

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On June 18, 1932, I collected several nests on choke-cherry near St. Paul, Minnesota. Some adult moths had already emerged from these nests under field conditions, but most of the inhabitants were in the larval stage. An examination of one nest revealed 250 larvae. The other nests were isolated at 23° C. Most of the larvae pupated by June 23, and moth emergence was heaviest from July 6 to July 15. Just before pupation, the larvae congregate in the center of the nest, usually in the fork of a branch, to spin rather loose cocoons. Later, the pupae work their way out and hang suspended from the outer portion of the nest. Following emergence of the adults, the pupal skins remain projecting from the nest. There is only one generation each year.

*Literature on Parasites of C. cerasivorana.*—Patch (1907) took *Pimpla conquisitor* at the nest of this tortricid on July 23 at Portland, Maine. She reared *Exochus albifrons* Cr. from nests received from Otisfield; *Labronchus* sp. from nests collected at Otisfield, Waldoboro, and Orono; and large numbers of a dipterous parasite, *Dichaetoneura leucoptera* Johnson, from nests collected at various localities.

*Methods and Results of Population Study.*—Forty-three nests of *C. cerasivorana* were collected on July 11, 1932. They represented the entire population present in a group of choke-cherry shrubs within a thirty-five foot length of roadside. Thus, by this late date, most of the moths had already emerged under the natural conditions of their environment. The branches supporting these nests were placed in water and kept in a room at 23° C. to enable more adults to emerge and to secure parasites of the species by means of mass rearing. On July 16, the webs were placed in a Carrier cabinet regulated at 12° C. to retard the emergence of the parasites until time was available to examine the material. Within a week afterward, all of the webs were carefully dissected and a count of the population taken. Moreover, a large number of larvae and pupae of different parasites were isolated individually in small vials and reared to maturity.

This colony of *C. cerasivorana* comprising 9,255 individuals subjected to the above methods gave the following results: adult emergence, 4102 or 44.3 per cent; live pupae, 271 or 2.9 per cent; dead pupae, 3657 or 39.5 per cent; live larvae, 68 or .7 per cent; dead larvae, 320 or 3.5 per cent; hymenopterous parasites, 285 or 3 per cent, and dipterous parasites, 552 or 6 per cent.

*Dipterous Parasites.*—Calculations based on 403 specimens show that about 94 per cent of the dipterous parasitism of *C. cerasivorana*

was due to *Nemorilla maculosa* Meig. Emergence of the latter under laboratory conditions began on July 9 and terminated on July 31; the largest numbers emerging from the 12 to the 20. *Phorocera tortricis* Coq., which accounted for about six per cent of the dipterous parasitism of this ugly-nest caterpillar, emerged intermittently from July 12 to July 31. Another dipteran obtained from a *C. cerasivorana* nest (mass rearing) was *Schizocerophaga leibyi* Tns. One puparium was formed on July 14 and the adult emerged on July 24, 1932.

*Hymenopterous Parasites.*—According to the results of this population study, hymenopterous parasitism amounted to three per cent. One of the most common hymenopterous parasites reared was *Dibrachys cavus* (Walk.). This species spends eight or nine days in the pupal stage, irrespective of host, at 23° C. *Dibrachys cavus* is not only a primary parasite of *C. cerasivorana* but also a secondary parasite, inasmuch as it attacks *Phorocera tortricis*, *Nemorilla maculosa*, and probably *Itopectis conquisitor* (Say), all of which are primary parasites of the ugly-nest caterpillar. Adult emergence of *D. cavus* from all hosts started on July 23 and concluded August 10, 1932. The mean number of adults reared from 28 individuals of *C. cerasivorana* was 12.9, range 4 to 36; while the mean number of adults reared from 22 puparia of *N. maculosa* was 11.4, range 4 to 17. Other hymenopterous parasites reared from this tortricid were 64 specimens of *Itopectis conquisitor* (Say), 25 individuals of *Triclistus curvator* (Fab.), 8 specimens of *Bassus agilis* (Cress.), and one example of *Cremastus epagoges* Cush. (mass rearing).

#### LITERATURE CITED.

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